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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants : K. Ahlgren et al. Group Art Unit: 1773

Serial No : 09/583,654 Examiner D. Tarazano

Filed : May 30, 2000 Attorney Docket No.: D-41939-10

Title : HEAT SHRINKABLE FILMS CONTAINING SINGLE SITE CATALYZED COPOLYMERS HAVING LONG CHAIN BRANCHING

APPEAL BRIEF UNDER 37 C.F.R. 1.192

Commissioner of Patents
Washington, D.C. 20231

Sir:

This Appeal Brief under 37 C.F.R. 1.192 is submitted in further to the Notice of Appeal filed 21 February 2002 (received in the Mail Room on 5 March 2002), the period for submission of the brief on appeal being extended two months, i.e., through July 5, 2002, by the concurrently-filed petition for a two-month extension of time. The Commissioner is authorized to charge Deposit Account 07-1765 should any further amount be deemed to be due. Appellants respectfully request reversal of the rejection, in view of the arguments presented below.

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REAL PARTY IN INTEREST

The real party in interest in this patent application is Cryovac, Inc., the assignee of a 100% interest in this application.

RELATED APPEALS AND INTERFERENCES

There is no other currently-pending appeal which is related to the instant appeal, i.e., there is no appeal pending of the claims of a related application, such as a continuation or divisional application.

THE STATUS OF THE CLAIMS

The claims on appeal are Claims 1, 3-5, 7-14, and 20-25. Claims 15-19 have been deemed to be allowable subject matter, but are objected to as depending from a rejected base claim. Claims 2 and 6 stand canceled. Although Claim 11 has not been deemed to be allowable subject matter and objected to as depending from a rejected base claim, there is currently no rejection whatsoever of Claim 11. A copy of the claims presently on appeal appears in the Appendix, Pages 24-28.

STATUS OF AMENDMENTS

No amendments have been filed since the filing of the Notice of Appeal.

SUMMARY OF THE INVENTION

As a first aspect, Appellants' invention is directed to a multilayer heat-shrinkable film suitable for packaging. The film comprises a homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then carbon atoms, with the single site catalyzed copolymer having long chain branching. [Page 8 lines 15-25.] Preferably the homogeneous single site catalyzed copolymer is a metallocene catalyzed copolymer. [Page 4 lines 17-31 and Page 7 line 31 – Page 8 line 8.] The single site catalyzed copolymer can be blended with another thermoplastic homopolymer or copolymer, and preferably has a density of from about 0.86 g/cc to about 0.95 g/cc. [Claims 4 and 5, and Examples on Pages 14-22.] Preferably, the multilayer film has an impact energy of from 2.32 to 3.45 ft-lbs. [Table 1 on Page 16 and Table 3 on Page 18.] Preferably, the multilayer film comprises a barrier layer. Preferably, at least one layer of the film is irradiated. [Page 9 line 27 through Page 10 line 26.] Preferably, the film is made by orientation at a temperature of from 70°C to 100°C. [Table 4, Pages 20-21.] Preferably, the film exhibits an L + T free shrink of at least 67 percent. [Table 1, Page 16, Table 2, Page 18.] Various multilayer film structures are also included in Appellants' invention. [Examples 1-5 and 11-19.] As a second aspect, the invention also pertains to a tubing comprising the film in accordance with Appellants' invention.

As a third aspect, Appellants' invention pertains to a process for making a heat-shrinkable film. The process comprises: (A) extruding a film comprising the homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then carbon atoms, the single site catalyzed copolymer having long chain branching; B) cooling the film to the solid state with water; C) reheating the film to a softening temperature of the

homogeneous single site catalyzed copolymer having long chain branching; D) stretching the film so that an oriented molecular configuration is produced; and E) quenching the film while substantially retaining its stretched dimensions to set the film in the oriented molecular configuration. [Page 14 line 24-Page 15 line 7.] The orientation can be carried out using a tenter frame. [Page 9 lines 11-26.]

ISSUES

The issues on appeal are as follows:

(I) WHETHER CLAIMS 1, 3-5, 7-10, 12-14, and 20-26 ARE OBVIOUS OVER US PATENT NO. 4,532,189, TO MUELLER, ET AL., IN VIEW OF U.S. PATENT NO. 5,272,236, TO LAI ET AL.

(II) WHETHER CLAIMS 1, 3, 7-10, and 20-22 ARE OBVIOUS OVER US PATENT NO. 4,615,922, TO NEWSOME ET AL., IN VIEW OF LAI ET AL.

(III) WHETHER CLAIMS 1, 3, 7-10, and 20-22 ARE OBVIOUS OVER LAI ET AL., IN VIEW OF U.S. PATENT NO. 3,022,543, TO BAIRD ET AL.

(IV) WHETHER CLAIM 11 IS PATENTABLE OVER THE PRIOR ART

THE GROUPING OF THE CLAIMS

For the purpose of this appeal only, the following claims stand or fall together:

(i) Appealed Claims 1, 3-5, 7, 10, and 24

(ii) Appealed Claims 8, 9, and 23 (Issue I) or 8, 9, and 23 (Issue III)

(iii) Appealed Claim 11

(iv) Appealed Claims 12-14

(v) Appealed Claims 20-22

(vi) Appealed Claims 25 and 26

(vii) Claims 15-19 (Not on Appeal)

More particularly, one or more separate arguments are asserted for each of the groupings of claims with respect to one or more of the issues presented below. Appellants reserve the right to later assert still further and more specific arguments if a continuation application is filed, in litigation of a patent issuing from the instant application, etc.

THE ARGUMENTS

(I) CLAIMS 1, 3-5, 7-10, 12-14, and 20-26 ARE PATENTABLE OVER MUELLER, ET AL. IN VIEW OF LAI ET AL '236

In Paragraph 1 of the 24 October Office Action, Claims 1, 3-5, 7-10, 12-14, and 20-26 are rejected under 35 USC 103, as obvious over U.S. Patent No. 4,532,189 to Mueller ("MUELLER"), in view of U.S. Patent No. 5,272,236, to Lai et al ("LAI et al '236"). The Examiner states that MUELLER teaches heat-shrinkable multi-layer films comprising DOWLEX 2045 (i.e., "LLDPE"), with Example II disclosing a blend of LLDPE and EVA, and that MUELLER teaches films exhibiting improved optical properties, with crosslinking and shrinkage, but that MUELLER fails to disclose substantially linear polyethylene having long chain branching. The Examiner states that LAI et al '236 teaches substantially linear polyethylene that has superior properties to conventional polyethylenes (including LLDPE), in terms of gloss, haze, and clarity, and that LAI et al '236 further teaches that resins of their invention would be useful in films and useful in blends. The Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use substantially linear olefin polymers of the type taught by LAI et al '236 in place of the LLDPE of the films taught by MUELLER, in order to produce a film having higher gloss, lower haze, and better clarity which could be more easily produced. Finally, the Examiner concludes that it would have been obvious to one of ordinary skill to have varied the orientation temperature of the films depending upon the desired temperature of shrinkage, since orientation temperature is directly related to shrink temperature.

Appellants contend that Claims 1, 3-5, 7-10, 12-14, and 20-26 are nonobvious over MUELLER in view of LAI et al '236, for several reasons. First, Appellants note that while

the film disclosed in MUELLER is a heat-shrinkable film, the film disclosed in LAI et al '236 is a blown film.[1] The blown film disclosed in LAI et al '236 would neither inherently perform as nor be recognized as a heat-shrinkable film within the scope of Appellants' claims, as the films of LAI et al '236 are made by a simple bubble process in which orientation is carried out immediately upon extrusion, i.e., while the polymer remains molten or at a temperature which is near molten. In contrast, orientation to produce the heat-shrinkable film of the invention involves first casting a primary film, then orienting the thick primary film well below the melting point of the film resins, and thereby producing biaxial heat-shrinkability which is much greater than any substantially mono-axial heat-shrinkability exhibited by blown films in similar packaging operations. Appellants direct attention especially to Claims 20-22, which recite orientation of the film at its softening temperature, which those of skill in the art recognize as being well below the melting point of the resin. Moreover, those of skill in the art recognize heat-shrinkable films as those films which exhibit a relatively high percentage free shrink in both the machine and transverse directions at temperatures substantially lower than any temperature at which a blown film may undergo any shrinkage. Still further, without annealing, a heat-shrinkable film generally has a shrink tension several orders of magnitude higher than the shrink tension usually generated by any shrinkage which may occur with a blown film.

Those of skill in the art recognize the very substantial difference in heat shrink characteristics between blown films and heat-shrinkable films. One of the characteristic differences between a blown film and a heat-shrinkable film is the virtual lack of shrinkage in the transverse direction for a blown film.

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[1] See Heading III below. The Examiner admits that LAI et al does not disclose heat-shrinkable films, but rather only discloses blown films. As a result, it is apparent that the Examiner also admits that there is a

Until Appellants' invention, there was a substantial element of chemical unpredictability in whether a long chain branched homogeneous ethylene/alpha-olefin copolymer could be oriented by the process MUELLER discloses for the preparation of heat-shrinkable films. The process disclosed by MUELLER is the extrusion of a thick-walled "tape" which is thereafter heated to its softening point and oriented via a trapped bubble. See MUELLER at Column 7 line 27 through Column 8 line 23. Some polymers have been found to possess enough melt strength for the production of heat-shrinkable films by the downward casting of a tape, while others have not had the requisite melt strength. Exxon's metallocene catalyzed linear ethylene/alpha-olefin copolymers (i.e., the EXACT® copolymers), although possessing the requisite strength for making a blown film, was found to lack the melt strength required to undergo the downward casting step used in MUELLER to make heat-shrinkable film. Thus, information regarding the use of a resin to make a blown film as well as any properties from the blown film is not dispositive as to whether the resin is satisfactory for use in the preparation of a heat-shrinkable film. Until Appellants' invention, whether long chain branched homogeneous ethylene/alpha-olefin copolymers have the requisite melt strength to produce the oriented films by the process of MUELLER was not known. Additionally, one could not rely on blown film information as disclosed in LAI et al '236 to predict whether a heat-shrinkable film, if made, would have beneficial properties. At most, it would be merely "obvious to try" or "obvious to experiment." However, obvious to try or obvious to experiment is not obvious under the law.[2]

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difference between blown films and heat-shrinkable films.

[2] *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988); *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir. 1991)

Appellants have discovered through experimental work that which was unpredictable: that homogeneous long chain branched ethylene/alpha-olefin copolymer can be used to make multilayer heat-shrinkable films using trapped bubble and tenter frame processes. In contrast, the Examiner states that LAI et al '236 discloses that long chain branching provides the polymer with improved processability, and that LAI et al '236 discusses processing advantages for homogeneous long chain branched ethylene/alpha-olefin copolymers. However, one of ordinary skill in the art would have recognized the disclosure of improved processability in LAI et al '236 as being directed to the extrusion of a *blown* film, which does not directly relate to the downward casting of a tape in the making of a *heat-shrinkable* film. Thus, the disclosure of improved processability does not necessarily teach or suggest operability for the making of a heat-shrinkable film, especially if the film is cooled to the solid state with water after extrusion, as recited in Appellants' Claims 25 and 26.

In addition, Appellants have discovered that heat-shrinkable films containing homogeneous ethylene/alpha-olefin copolymer having long chain branching can show unexpected improvements in shrink and impact energy. More particularly, turning to Table 1 on Page 16 of Appellants' specification, Example 6 is a test of the film of Example 1, while Example 10 is a test of the film of comparative Example 5. The film of Example 1 is identical to the film of Example 5, except that the film of Example 1 contained 85% homogeneous copolymer having long chain branching in the outermost layer of the precursor film, whereas the film of comparative Example 5 contained 85% Dowlex™ 2045 linear low density polyethylene in the outermost layer of the precursor film. This is the same polymer as disclosed in MUELLER, i.e., the polymer referred to in the office action. As can be seen by comparing the results of the film of Example 1 with the film of comparative Example 5, the film of Example 1 exhibited significant higher free shrink (73% versus 49.9%), as

well as higher impact energy (2.35 ft-lbs versus 2.20 ft-lbs). This comparison of the film of Example 1 with the film of comparative Example 5 is a comparison which goes directly to whether the claimed film in accordance with Claims 1, 3-5, 7-10, 12-14, and 20-23 is obvious over MUELLER in view of LAI et al '236, because the evidence shows that Appellants discovered that substituting the copolymer of LAI et al '236 for the Dowlex™ 2045 resin of MUELLER produced unexpected results in the area of free shrink and impact energy.

More particularly, Claims 8, 9, and 23 recite impact energy and free shrink in accordance with the unexpected improvement in impact energy and free shrink argued above. As can be seen from the contents of Table 1, Appellants have discovered that the substitution of the polymer of LAI et al '236 provides unexpected advantages over the film of MUELLER, i.e., higher instrumented impact energy than the film of comparative Example 5. This evidence of unexpected results is not mere argument; rather, it is evidence which Appellants have sworn to in their executed Declaration which accompanied the filing of their application. As such, this evidence need not be provided in the form of a declaration under 37 CFR §132. Moreover, this evidence was not generated in response to the rejection of the claims; rather, it has been disclosed in Appellants' specification since November 30, 1992.

Although the Office Action suggests modifying MUELLER with the polymer of LAI et al '236 for the purpose of improving the gloss, haze, and clarity, i.e., optical properties, the improvements Appellants have discovered are of a different nature. The impact energy and the free shrink at low temperature (e.g., at 185°F and 195°F) are important properties, especially for the packaging of foods. In the packaging of fresh meat products, it is advantageous for the film to have a relatively high free shrink at a relatively low temperature, so that the film can be heated and

thereby shrunk tight against the meat product, without any adverse effect upon the food product while heat-shrinking the film.

Appellants' specification, as filed, contains evidence of unexpected result relative to substituting the polymer of LAI et al '236 for the LLDPE in MUELLER. As such, Appellants contend that the specification as filed, which they have declared under oath to be a description of their invention, clearly demonstrates the unexpected superiority their claimed multilayer heat-shrinkable films over the heat-shrinkable film of MUELLER.

Further evidence of unexpected results is set forth in Table III. A comparison of films produced with equal irradiation, i.e., Examples 11, 14, and 17 each irradiated at 2 megarads, shows that the films of Appellants' invention (Examples 11 and 14, containing homogeneous copolymer having long chain branching) exhibited higher peak instrumented impact strength (59.6 pounds and 63.0 pounds, respectively) than the heterogeneous Attane™ 4203 very low density polyethylene resin of Example 17 (52.8 pounds). Moreover, the films of Examples 11 and 14 exhibited higher impact energy (3.45 ft-lbs and 3.36 ft-lbs) than the LLDPE based film of Example 17 (2.83 ft-lbs). These are further evidence of unexpected results over films containing heterogeneous resin, such as the LLDPE resin of MUELLER. Again, this result is not taught or suggested in LAI et al '236, and is unexpected over LAI et al '236. Additional unexpected impact results can be gleaned from comparing the Table III results of the films of Examples 12 and 15 (impact energy of 3.08 and 2.96 ft-lbs, respectively) with the film of comparative Example 18 (impact energy of 2.87 ft-lbs), all of which were irradiated at 4 megarads. Still further unexpected results can be seen in Table III by comparing Examples 13 and 16 (impact energy of 3.17 and 3.39 ft-lbs, respectively) with the film of comparative Example 19 (impact energy of 3.01 ft-lbs), all of which were irradiated at 6

megarads. These unexpected results support the patentability of all pending claims reciting irradiation, i.e., Claims 12, 13, and 14.

Still further evidence of unexpected results for Appellants' Claims 12-14 can be gleaned from an examination of Table II, on Pages 17-18 of Appellants' specification. Table II provides evidence in Examples 11-16 that various multilayer films made according to Appellants' disclosed process for making a heat-shrinkable film, utilizing homogeneous ethylene alpha-olefin copolymer having long chain branching, provide *a increasing orientation speed as the amount of irradiation dosage increases,* relative to corresponding comparative multilayer films set forth Comparative Examples 17-19, which contained a heterogeneous ethylene octene copolymer of approximately the same density i.e., 0.904 g/cc for the homogeneous resin and 0.905 g/cc for the heterogeneous resin. More particularly, note that for the films of Examples 11-13 the orientation speed increased from 46 to 53 feet per minute as the irradiation was increased from 2 to 4 MR; for the film of Examples 14-16, the orientation speed increased from 40 to 46 to 51 feet per minute as the irradiation dosage was increased from 2 to 4 to 6 MR. In contrast, for the film of comparative Examples 17-19, the orientation speed remained constant at 46 feet per minute as the irradiation dosage was increased from 2 to 4 to 6 feet per minute. Thus, the application as filed demonstrates yet another unexpected result: irradiated, oriented films in accordance with the invention (i.e., the film claimed in Appellants' Claims 12-14) can be made at increasing orientation speed as the amount of irradiation increases from 2 megarads to 6 megarads. This is further evidence in support of the patentability of Claims 12-14, because prior to Applicant's invention, one would not know whether these homogeneous resin having long chain branching could be made into heat-shrinkable films, especially in view of the current knowledge of inadequate processing of single site products at the time.

Accordingly, Appellants contend that the subject matter of Claims 1 and 3-5, 7-10, 12-14, and 20-26, have been shown to provide unexpected results, and Appellants respectfully request reversal of the rejection of these claims as obvious over MUELLER in view of LAI et al '236.

In summary of the unexpected results, Appellants note that their claimed film exhibits (1) an unexpected increase in free shrink, and (2) an unexpected increase in impact energy and peak instrumented impact strength; and that their claimed film (3) can be oriented at increased orientation speeds with increasing degrees of irradiation. Appellants contend that their specification is clear in disclosing unexpected results over films such as the film disclosed in MUELLER. Appellants' discovery of higher free shrink, higher impact energy (and higher instrumented impact strength), and higher orientation speed as radiation dosage increases, does not follow from the disclosure of blown film in LAI et al '236 of improved optical properties such as haze and clarity. Thus, even if a prima facie case of obviousness has been made out, Appellants have demonstrated, from the November 30, 1992 filing date of their application, that their claimed film exhibits unexpected results, and Appellants are entitled to a patent for their invention. Accordingly, Appellants respectfully request withdrawal of the rejection of Claims 1, 3-5, 7-10, 12-14, and 20-26.

(II) CLAIMS 1, 3, 7-10, and 20-22 ARE PATENTABLE OVER NEWSOME ET AL IN VIEW OF LAI ET AL '236

In Paragraph 2 of the 24 October Office Action, Claims 1, 3, 7-10, and 20-22 are rejected under 35 USC 103, as obvious over U.S. Patent No. 4,615,922 to Newsome ("NEWSOME"), in view of LAI et al '236. The Examiner states that NEWSOME teaches oriented films having surface layers containing LDPE and barrier core layers comprising EVOH, but that NEWSOME fails to teach films containing substantially linear polyethylene

having long chain branching. However, the Examiner goes on to state that it would have been obvious at the time the invention was made to have used substantially linear olefin polymers of the type taught by LAI et al in place of LLDPE as taught by NEWSOME, in order to produce a film having higher gloss, lower haze, and better clarity which can be produced more easily.

Appellants contend that Claims 1, 3, 7-10, and 20-23 are nonobvious over NEWSOME et al in view of LAI et al '236, for many of the same reasons these claims are patentable over MUELLER in view of LAI et al '236. First, Appellants note that while the film disclosed in NEWSOME et al is a heat-shrinkable film, the films disclosed in LAI et al '236 are blown films. The blown film disclosed in LAI et al '236 would neither inherently perform as nor be recognized as a heat-shrinkable film within the scope of Appellants' claims, for the reasons described above. In contrast, Appellants' claimed heat-shrinkable film is made by casting a primary film, followed by orienting the thick cast film at a temperature well below the melting point of the film resins, thereby producing biaxial heat-shrinkability greater than any blown film. Again, until Appellants' invention, there was a substantial element of chemical unpredictability in whether a long chain branched homogeneous ethylene/alpha-olefin copolymer could have been oriented by the process NEWSOME et al for the preparation of a heat-shrinkable film. The process disclosed by NEWSOME et al is the extrusion of a thick-walled "tape" which is thereafter heated to its softening point and oriented via a trapped bubble. See NEWSOME et al at Column 10 lines 19-47. Again, some polymers have been found to possess enough melt strength for the production of heat-shrinkable films by the downward casting of a tape, while others have not had the requisite melt strength. Exxon's metallocene catalyzed linear ethylene/alpha-

olefin copolymers (i.e., the EXACT® copolymers) lack the melt strength required to undergo the downward casting step used in NEWSOME et al to make heat-shrinkable film. Until Appellants' invention, whether long chain branched homogeneous ethylene/alpha-olefin copolymers have the requisite melt strength to produce the oriented films by the process of NEWSOME et al was not known. Additionally, one could not rely on blown film information as is disclosed in LAI et al '236 to predict whether a heat-shrinkable film, if made, would have beneficial properties. At most, it would be merely "obvious to try" or "obvious to experiment."

In addition, Appellants again rely upon their discovery that heat-shrinkable films containing homogeneous ethylene/alpha-olefin copolymer having long chain branching can show unexpected improvements in shrink and impact energy, as argued above under heading I. Although the Office Action suggests modifying NEWSOME et al with the polymer of LAI et al '236 for the purpose of improving the gloss, haze, and clarity, i.e., optical properties, the improvements Appellants have discovered are of a different nature. Again Appellants have referred to improvements in impact energy and heat-shrinkability at low temperature (e.g., at 185°F and 195°F), which are important properties for the packaging of foods, especially fresh meat products.

(III) CLAIMS 1, 3, 7-10, and 20-22 ARE PATENTABLE OVER LAI ET AL '236 IN VIEW OF BAIRD JR ET AL

In Paragraph 3 of the 24 October Office Action, Claims 1, 3, 7-10, and 20-22 are rejected under 35 USC 103, as obvious over LAI et al '236 in view of U.S. Patent No. 3,022,543, to Baird Jr et al ("BAIRD Jr et al"). The Office Action states that LAI et al '236 teaches blown films as relied upon in the rejections above, but that LAI et al '236 does not teach heat-shrinkable films, but that BAIRD Jr et al teaches methods for making heat-shrinkable films to create tight fitting packages,

eliminate wrinkles, and eliminate dead space around the articles. The Examiner concluded that it would have been obvious to have used the orientation methods taught by BAIRD Jr et al to orient the films of LAI et al '236 to produce a heat-shrinkable film useful for packaging, the film having improved appearance for a better package, the Examiner further stating that it would have been obvious to have varied the orientation temperature of the films depending upon the desired temperature of shrinkage since the orientation temperature is directly related to the shrink temperature, and to have increased the film thickness to provide a stronger film for packaging applications.

In response, Appellants contend Claims 1, 3, 7-10, and 20-22 are patentable over LAI et al '236 in view of BAIRD Jr et al. Appellants contend that the Office Action does not make out a prima facie case of obviousness of either of any one or more of Claims 1, 3, 7-10, and 20-22. Moreover, Appellants have provided evidence of unexpected results over LAI et al '236 in view of BAIRD Jr et al.

It appears that the Examiner is relying upon Figure 2 of BAIRD Jr et al, and the accompanying description thereof, which discloses a process in which a blown film is produced via the upward extrusion of blown bubble 52, with the resulting tubular film being irradiated, heated in hot water, and thereafter oriented in the solid state via trapped bubble 38, to produce a film the Office Action refers to as a "blown shrinkable film."

LAI et al '236 discloses a blown film having a thickness of 1 mil. See Column 21 line 3 of LAI et al '236. If this 1 mil thick blown film is converted to a heat-shrinkable film using a trapped bubble by the tandem process of Figure 2 of BAIRD Jr. et al, such a film would have a final thickness of from about 0.04 to 0.11 mil, assuming a typical 3 x 3 to a 5 x 5 orientation, i.e., an orientation in accordance with Applicant's specification. Appellants

contend that this film would be too thin to be useful as, for example, a heat-shrinkable bag for the packaging of meat. Moreover, such a thin heat-shrinkable film would not have an impact energy high enough to meet the impact energy recited in Appellants' Claims 8 and 9.

In substantiating this rejection of Appellants' claims, the Examiner has stated that it would have been obvious to lower the orientation temperature to obtain the desired shrink character, and that it would also have been obvious to thicken the film of LAI et al so that upon carrying out the process of BAIRD Jr et al, the resulting film would have a strength commensurate with the desired end use. Appellants note that in making a blown film, which is the first step of the process of BAIRD Jr et al, the film is blown while molten. Those of skill in the art know well that blowing the film while molten results in molecular alignment which generates relatively high crystallinity, i.e., compared to downward casting used in the preparation of most heat-shrinkable films. As a result, when reheating the resulting blown film of BAIRD Jr et al with hot water for the trapped bubble orientation (i.e., the solid-state orientation to produce heat-shrinkable character), the high crystallinity of the blown extrudate makes it difficult to carry out the solid state orientation, i.e., the trapped bubble will very likely break the film during solid-state orientation. BAIRD Jr et al discloses the blown film followed by solid-state orientation for a film made from low density polyethylene, i.e., LDPE. Those of skill in the art know that LDPE possesses very high entanglement and very high melt strength relative to other ethylene polymers. Moreover, as homogeneous ethylene/alpha-olefin copolymers exhibit relatively low melt strength compared to most other ethylene polymers, especially LDPE, one of skill in the art would have been skeptical as to whether the substantially linear ethylene copolymer of LAI et al '236 could be substituted for LDPE in the process of BAIRD Jr et al. In fact, it may be

that the substantially linear copolymer of LAI et al cannot be substituted for the LDPE of BAIRD Jr et al. As a result, Appellants contend that the Office Action fails to make out a prima facie case of obviousness of Claims 1, 3, 7-10, and 20-22 as unpatentable over LAI et al '236 in view of BAIRD Jr et al.

In addition to the above, Appellants again direct attention to the various unexpected results provided above in response to the §103 rejection based on MUELLER in view of LAI et al '236. That is, Appellants' specification demonstrates that the claimed films exhibit higher shrink energy and higher impact strength than was obtained for both DOWLEX® 2045 (i.e., LLDPE) as well as ATTANE® 4203 (i.e., VLDPE). Again, in BAIRD Jr et al, the preferred polymer for use in the films is LDPE. See Column 4 lines 46-48 of BAIRD Jr et al. This resin provided advantages above "conventional" high density polyethylene. Those of skill in the art recognize that the impact performance of LDPE is less than the impact performance of either LLDPE or VLDPE. The unexpected results demonstrated with respect to the LLDPE and VLDPE resins disclosed by MUELLER clearly also establishes unexpected results over BAIRD Jr et al. As Appellants have demonstrated, unexpected results over MUELLER in view of LAI et al '236 also demonstrate the patentability of Appellants' claimed film over LAI et al '236 in view of BAIRD Jr et al.

CLAIM 11 IS PATENTABLE OVER THE PRIOR ART

Appellants point out that although Claim 11 is pending and on appeal, the October 24 Office Action does not set forth any rejection whatsoever of Claim 11. As such, Appellants contend that Claim 11 is not taught or suggested by the prior art of record.

CONCLUSION

Based on all the arguments set forth above, Appellants respectfully request that the Board of Appeals reverse the rejection of Claims 1, 3-5, 7-14, and 20-25. Appellants contend that one of skill in the art would not have used a teaching pertaining to a blown film made from homogeneous copolymer (i.e., LAI et al '236) to modify a teaching pertaining to a heat-shrinkable film (i.e., MUELLER or NEWSOME); and that one of skill in the art would not have used a teaching pertaining to a "blown shrinkable film" (i.e., BAIRD Jr et al) to modify a teaching directed to a blown film made from a homogeneous substantially linear copolymer (i.e., LAI et al '236). Moreover, Claims 15-19 have been deemed patentable in the 24 October Office Action, and hence are not on appeal. Appellants respectfully request reconsideration of the patentability of Claims 1, 3-5, 7-14, and 20-25, with a view towards allowance.

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Respectfully submitted,

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Appendix

The pending claims in the case are Claims 1, 3-5, and 7-26, as follows:

1. A film suitable for packaging comprising a homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then carbon atoms, said single site catalyzed copolymer having long chain branching, wherein said film is a multilayer film and is heat shrinkable.

3. The heat shrinkable film as set forth in claim 1, wherein said alpha-olefin has from four to eight carbon atoms.

4. The film as set forth in claim 1, wherein said single site catalyzed copolymer is blended with another thermoplastic homopolymer or copolymer.

5. The film as set forth in claim 1, wherein said single site catalyzed copolymer has a density of from about 0.86 g/cc to about 0.95 g/cc.

7. The film according to Claim 1, wherein the homogeneous single site catalyzed copolymer has a density of from about 0.895 to 0.915 g/cc.

8. The film according to Claim 1, wherein the multilayer film has an impact energy of from 2.32 to 3.45 ft-lbs.

9. The film according to Claim 1, wherein the multilayer film has an impact energy of at least 3.08 ft-lbs.

10. The film according to Claim 1, wherein the homogeneous single site catalyzed copolymer is metallocene catalyzed copolymer.

11. The multilayer film according to Claim 1, wherein the multilayer film comprises a barrier layer containing at least one member selected from the group consisting of: (a) a copolymer of vinylidene chloride and vinyl chloride, (b) a copolymer of vinylidene chloride and methyl acrylate, (c) a copolymer of ethylene and ethyl acrylate, (d) a copolymer of vinylidene chloride and acrylonitrile, and (e) a copolymer of ethylene and vinyl alcohol.

12. The multilayer film according to Claim 1, wherein at least one layer of the film is irradiated.

13. The multilayer film according to Claim 12, wherein the film is irradiated to a level of up to about 12 MR.

14. The multilayer film according to Claim 13, wherein the film is irradiated to a level of from about 2 to 9 MR.

15. The multilayer film according to Claim 1, wherein the film comprises:

(A) a first layer comprising ethylene/vinyl acetate copolymer;

(B) a second layer comprising a blend of homogeneous/ethylene octene copolymer having long chain branching, and ethylene/butyl acrylate copolymer;

(C) a third layer comprising vinylidene chloride/methyl acrylate copolymer; and

(D) a fourth layer comprising a blend of ethylene/vinyl acetate copolymer and linear low density polyethylene.

16. The multilayer film according to Claim 1, wherein the film comprises:

(A) a first layer comprising ethylene/vinyl acetate copolymer;

(B) a second layer comprising a blend of homogeneous ethylene octene copolymer having long chain branching and ethylene/methacrylic acid copolymer;

(C) a third layer comprising vinylidene chloride/methyl acrylate copolymer; and

(D) a fourth layer comprising a blend of ethylene/vinyl acetate copolymer and linear low density polyethylene.

17. The multilayer film according to Claim 1, wherein the film comprises:

(A) a first layer comprising ethylene/vinyl acetate copolymer;

(B) a second layer comprising a blend of homogeneous ethylene/octene copolymer having long chain branching and anhydride grafted ethylene/vinyl acetate copolymer;

(C) a third layer comprising vinylidene chloride/methyl acrylate copolymer;

(D) a fourth layer comprising a blend of ethylene/vinyl acetate copolymer and linear low density polyethylene.

18. The multilayer film according to Claim 1, wherein the film comprises:

(A) a first layer comprising ethylene/vinyl acetate copolymer;

(B) a second layer comprising a blend of homogeneous ethylene/octene copolymer having long chain branching and ethylene/vinyl acetate copolymer;

(C) a third layer comprising vinylidene chloride/methyl acrylate copolymer;

(D) a fourth layer comprising a blend of ethylene/vinyl acetate copolymer and linear low density polyethylene.

19. The multilayer film according to Claim 1, wherein the film comprises:

(A) a first layer comprising ethylene/vinyl acetate copolymer;

(B) a second layer comprising homogeneous ethylene/octene copolymer having long chain branching;

(C) a third layer comprising ethylene/vinyl acetate copolymer; and

(D) a fourth layer comprising vinylidene chloride/methyl acrylate copolymer; and

(E) a fifth layer comprising a blend of ethylene/vinyl acetate copolymer and linear low density ethylene/alpha-olefin copolymer.

20. The multilayer film according to Claim 1, wherein the film has been oriented at a softening temperature of the single site catalyzed copolymer having long chain branching.

21. The multilayer film according to Claim 20, wherein the film has been oriented at a temperature of from 70°C to 100°C.

22. The multilayer film according to Claim 20, wherein the film has been oriented at a temperature of from 80°C to 100°C.

23. The multilayer film according to Claim 1, wherein the film exhibits an L + T free shrink of at least 67 percent.

24. A tubing comprising a heat-shrinkable multilayer film suitable for packaging, wherein the film comprises a homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then carbon atoms, the single site catalyzed copolymer having long chain branching.

25. A process for making a heat-shrinkable film, comprising:

(A) extruding a film comprising a homogeneous single site catalyzed copolymer of ethylene and an alpha-olefin having from three to then carbon atoms, the single site catalyzed copolymer having long chain branching; and

B) cooling the film to the solid state with water;

C) reheating the film to a softening temperature of the homogeneous single site catalyzed copolymer having long chain branching;

D) stretching the film so that an oriented molecular configuration is produced; and

E) quenching the film while substantially retaining its stretched dimensions to set the film in the oriented molecular configuration.

26. The process according to Claim 25, wherein the step of orienting by stretching is carried out using a tenter frame.